Listing of Claims:

This listing of claims will replace all prior versions of claims in the application.

1-46.   (Cancelled).

47.   (Previously Presented) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information, determining natural frequency data of said structure, and determining the stiffness parameters of said structure using said natural frequency data;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a first order eigenvalue sensitivity analysis and one of the generalized inverse method, gradient method, or quasi-Newton method,

wherein a number of said stiffness parameters is larger than a number of system equations such that the system equations are severely underdetermined.

48.   (Cancelled).

49.   (Previously Presented) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration

information; and

a stiffness parameter unit for receiving said vibration information and determining said

stiffness parameters with an iterative processing unit;

wherein said stiffness parameter unit comprises an iterative processing unit that

determines said stiffness parameters using a first order eigenvalue sensitivity analysis ,

wherein a number of said stiffness parameters is larger than a number of system

equations such that the system equations are severely underdetermined.

50-55. (Cancelled).

56.   (Currently Amended) A system for determining stiffness parameters of a structure,

comprising:

a structure;

a random impact device for introducing vibrations in said structure, said random impact

device comprising[[,]]:

a random signal generating unit for generating first and second outputs;

a random impact actuator for receiving said first and second outputs; and

an impact applicator coupled to said random impact actuator, wherein said

random impact actuator drives said impact applicator such that [[the]] force and

arrival times of said impact applicator at said structure are random;

a sensor arranged to measure vibrations of said structure and output vibration

information; and

a stiffness parameter unit for receiving said vibration information, determining natural

frequency data of said structure, and determining the stiffness parameters of said structure using said natural frequency data.

57.   (Previously Presented) The system of claim 56, wherein said random impact actuator drives said impact applicator in accordance with said first and second outputs.

58.   (Previously Presented) The system of claim 57, wherein the first and second outputs comprise independent random variables.

59.   (Currently Amended) ~~The system of claim 58,~~ A system, comprising:

a structure;

a random impact device for introducing vibrations in said structure, said random impact device comprising:

a random signal generating unit for generating first and second outputs;

a random impact actuator for receiving said first and second outputs; and

an impact applicator coupled to said random impact actuator,

wherein said random impact actuator drives said impact applicator such that force and arrival times of said impact applicator at said structure are random;

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information, determining natural frequency data of said structure, and determining the stiffness parameters of said

structure using said natural frequency data,

wherein said random impact actuator drives said impact applicator in accordance with said first and second outputs,

wherein the first and second outputs comprise independent random variables, and

wherein the first and second outputs determine the force and arrival times, respectively, of the impact applicator at said structure.

60.   (Previously Presented) A system for determining stiffness parameters of a structure, comprising:

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit for receiving said vibration information, determining mode shape information, and determining the stiffness parameters of said structure using said mode shape information;

wherein said stiffness parameter unit comprises an iterative processing unit that determines said stiffness parameters using a first order eigenvector sensitivity analysis,

wherein a number of said stiffness parameters is larger than a number of system equations such that the system equations are severely underdetermined.

61.   (Cancelled).

62.   (New) A system for determining stiffness parameters of a structure, comprising:

a random impact device configured to introduce vibrations in said structure, said random

- 6 -

impact device comprising:

a random signal generating unit for generating first and second outputs;

a random impact actuator for receiving said first and second outputs; and

an impact applicator coupled to said random impact actuator, random impact actuator being configured to drive said impact applicator such that force amplitude and arrival times of said impact applicator at said structure are random;

a sensor arranged to measure vibrations of said structure and output vibration information; and

a stiffness parameter unit configured to receive said vibration information, determining natural frequency data of said structure, and determine the stiffness parameters of said structure using said natural frequency data.

63.   (New) The system for determining stiffness parameters of a structure in accord with claim 62, wherein said random impact actuator is configured to drive said impact applicator in accord with said first and second outputs.

64.   (New) The system for determining stiffness parameters of a structure in accord with claim 63, wherein the first and second outputs comprise independent random variables.

65.   (New) The system for determining stiffness parameters of a structure in accord with claim 64, wherein the first and second outputs determine the force amplitude and arrival times, respectively, of the impact applicator at said structure.